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The Impact of Schools on Learning Achievement of Children

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The Impact of Schools on Learning Achievement of Children[1]

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How much difference do teachers and school facilities make in learning? How important are parents as teachers or reading and study outside of school to child achievement? Recent studies have concluded that schools make little difference in child achievement; most of the difference is caused by social background and inherited ability. The results of this study indicate that schools do make a significant contribution to child achievement, in particular to the achievement by lower achieving children.

The results of this study are based on a sample of 208 children in the Columbus, Ohio, public schools completing Grade IV as of June 1973. The data include the complete achievement test histories of these children and information about their schools, teachers, families, and non-school inputs. There are many problems with the use of achievement test scores to measure cognitive skills. However, these test scores still provide the best widely available quantitative measure of the cognitive skills of children.

IMPACT OF SCHOOLS ON ACHIEVEMENT

There is increasing evidence that children enter schools with widely differing quantities of learned cognitive skills. If true, then the major contribution of schools may be to offset the existing (or more likely increasing) differences in cognitive skills resulting from variations in non-school inputs. Within this context, schools are not expected to generate increasing variation in cognitive skills as most previous studies have hypothesized, but to reduce this variation at least relative to the case of no schools and perhaps absolutely. Most of the variation in cognitive skills at any point in time is due to differences in non-school inputs, social background, and inherited ability, as previous studies have found.

If the major differences in cognitive skill levels are caused by non-school inputs, in particular parent teaching, then evidence is needed that schools offset increasing differences in cognitive skill levels resulting from

[1]This research was jointly supported by the National Institute of Education, U. S. Dept. of Health, Education, and Welfare, and the Ohio Agricultural Research and Development Center. Points of view or opinions stated do not necessarily represent official position or policy of the supporting organizations.

This circular is a summary and extension of Hushak, Leroy J., 1973, The Contribution of School and Non-School Inputs to Student Achievement, ERIC Document No. ED 085 410, Eric Document Reproduction Service, Bethesda, Md.,

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non-school inputs. Two kinds of evidence from this study are relevant. First, means and variances of test scores are presented. Second, the results of statistically estimated achievement relationships which pertain to the offsetting impact of schools are summarized.

Variances and means of test scores are presented in Tables 1 and 2 for all tests with at least two comparable test scores. Each test score is measured by raw score (number of correct answers) as a percent of total possible score. There are fewer children in the sample at lower grade levels because some children moved into the school system between grades I and IV.

While caution must be exercised because test scores may not accurately measure cognitive skills, the results indicate that lower achieving children gain relative to higher achieving children when individual skills are compared. This is a much stronger result than can be predicted from the reasoning above. It presents a significantly different picture from the usual one that lower achieving children tend to fall further behind over time, although it does not negate a falling behind in total skills. In Table 1, a significant reduction in the variance of test scores occurs in all comparisons for the total sample and white children; *i.e.*, the differences in skill levels decline over time. Non-white children show no significant changes in variance, which is still consistent with the offsetting impact of schools.

Mean test scores are presented and compared on the basis of the algebraic change in mean in Table 2. In all comparisons except one (Reading Comprehension, Grades II-III, Father's Education Is High School Graduate or Less), non-white children showed greater mean gains in test scores than white children. White children whose fathers were high school graduate or less made greater gains for all comparisons than white children whose fathers had post high school education. The gain is more equally distributed for non-white children, with less difference between beginning test scores.

More direct evidence of the offsetting impact of schools is provided by two types of statistical achievement relationships. First, an achievement gain relationship estimates the impact of school inputs, non-school inputs, and social background factors on the rate at which children learn within some time period. In this study, the time period was from the beginning of Grade III to the end of Grade IV, the points at which the Grades III and IV achievement tests were administered. Second, a stock relationship estimates the impact of these same factors on how much children know at one point in time, in this study at the end of Grade IV.

The strongest evidence that schools compensate for differences in non-school inputs, in particular parent teaching, is a strong positive rela-

TABLE 1.—Variances and Variance Ratios of Comparable Reading Test Scores.

	All Children			White Children			Non-White Children		
	No.	Variance	Variance Ratio*	No.	Variance	Variance Ratio*	No.	Variance	Variance Ratio*
Word Identification									
Grade I	173	324	1.60††	116	292	1.60††	57	303	1.36
Grade II	182	202		124	182		58	222	
Reading Vocabulary									
Grade III	187	595	1.47††	131	581	1.57††	56	369	0.97
Grade IV	206	404		143	369		63	380	
Reading Comprehension									
Grade II	182	673	1.23**	124	732	1.34**	58	412	0.99
Grade III	187	548	1.27†	131	548	1.34†	56	416	1.08
Grade IV	206	433		143	408		63	384	

*Variance Ratio = Test Score Variance (t-1) ÷ Test Score Variance (t).
**Significant at the 10 percent level.
†Significant at the 5 percent level.
††Significant at the 1 percent level.

TABLE 2.—Means and Changes in Means of Comparable Reading Test Scores.

Test	All Children			White Children			Non-White Children		
	No.	Mean	Change in Mean*	No.	Mean	Change in Mean*	No.	Mean	Change in Mean*
TOTAL SAMPLE									
Word Identification									
Grade I	173	68.8		116	72.6		57	61.2	
			9.1			7.1			12.8
Grade II	182	77.9		124	79.7		58	74.0	
Reading Vocabulary									
Grade III	187	49.1		131	54.9		56	35.4	
			15.9			14.0			20.8
Grade IV	206	65.0		143	68.9		63	56.2	
Reading Comprehension									
Grade II	182	40.4		124	45.1		58	30.5	
			16.4			16.0			16.2
Grade III	187	56.8		131	61.1		56	46.7	
			5.0			4.5			6.6
Grade IV	206	61.8		143	65.6		63	53.3	
FATHER'S EDUCATION IS HIGH SCHOOL GRADUATE OR LESS									
Word Identification									
Grade I	91	63.1		60	66.7		31	56.2	
			10.7			8.5			14.9
Grade II	95	73.8		62	75.2		33	71.1	
Reading Vocabulary									
Grade III	96	42.8		66	47.7		30	31.9	
			16.5			15.4			19.8
Grade IV	105	59.3		69	63.1		36	51.7	
Reading Comprehension									
Grade II	95	34.3		62	36.3		33	30.4	
			15.1			16.6			11.4
Grade III	96	49.4		66	52.9		30	41.8	
			6.6			6.6			7.4
Grade IV	105	56.0		69	59.5		36	49.2	

*Change in Mean = Mean Test Score (t) — Mean Test Score (t-1).

TABLE 2 (Continued).—Means and Changes in Means of Comparable Reading Test Scores.

Test	All Children			White Children			Non-White Children		
	No.	Mean	Change in Mean*	No.	Mean	Change in Mean*	No.	Mean	Change in Mean*
FATHER'S EDUCATION IS POST HIGH SCHOOL EDUCATION									
Word Identification									
Grade I	82	75.1		56	78.9		26	67.1	
			7.2			5.2			10.7
Grade II	87	82.3		62	84.1		25	77.8	
Reading Vocabulary									
Grade III	91	55.7		65	62.3		26	39.3	
			15.4			12.1			22.7
Grade IV	101	71.1		74	74.4		27	62.0	
Reading Comprehension									
Grade II	87	47.1		62	53.8		25	30.7	
			17.4			15.6			21.7
Grade III	91	64.5		65	69.4		26	52.4	
			3.4			1.8			6.4
Grade IV	101	67.9		74	71.2		27	58.8	.

*Change in Mean = Mean Test Score (t) — Mean Test Score (t-1).

tionship between father's education and achievement level at the end of Grade IV, but no relationship between father's education and the rate at which children learned over the Grade III-IV period. In other words, children with less educated parents learned cognitive skills as rapidly as children with more educated parents over this period, but started and ended this period with fewer skills in total. The results further indicate that lower achieving children are concentrated in the larger, more highly non-white schools, factors often associated with "poor" schools. However, children in these schools learned as rapidly as children in smaller, more highly white schools.

The picture which emerges is that children with more highly educated parents have learned many of the skills being tested by the time the first test for any skill is given. As schools teach these skills, the children of less educated parents learn them.

IMPACT OF NON-SCHOOL INPUTS

The impact of father's education, interpreted as a measure of parents' teaching ability, on the early learning of cognitive skills by children, and the neutralization of this impact by schools during the Grade III-IV period were discussed earlier. Other non-school inputs have important effects on the rates at which children learn. The amount of time a child spends studying at home increased the rate at which the more applied skills are learned (Arithmetic Computations, Arithmetic Applications, and Spelling). Lower achieving children spent more time studying at home than higher achieving children. Time spent watching television reduced the rate at which applied skills were learned. Lower achieving children also watched more television. Both factors were neutral with respect to reading skills and Arithmetic Concepts.

The frequency of visits to zoos, museums, public libraries, and other similar activities had a negative impact on the rate of gain in cognitive skills. If taken at face value, this result implies that these activities use time otherwise available for activities which have a greater impact on cognitive skills. Lesser achieving children tend to spend more time in these activities.

Lesser educated parents tend to help their children more frequently with school work. This greater help appears to have a marginally positive impact on cognitive skills learned, but the interaction between the quantity and quality of parent help could not be estimated.

IMPLICATIONS

The results of this study provide evidence that schools equalize the rates of achievement gain among children. Schools equalize rates of gain by providing learning inputs, in particular skilled teaching, to which lower achieving children do not have access outside of school. However, these results must be interpreted with caution. They are based on a small sample from a single school system which may not be representative of other schools. They do not imply that schools make efficient use of resources, or allocate resources to equalize rates of achievement gain or total achievement. A "poor" teacher may be able to stimulate a greater gain in a low achieving child than a "good" teacher can stimulate in a high achieving child. This is because a low achieving child is ready to learn a much greater set of skills than the high achieving child who is learning new skills from parents as soon as he (she) is ready to learn them.

Further, it is not clear whether schools equalize achievement gain by increasing the rate at which lower achieving children learn or by retarding the rate at which higher achieving children learn. They probably do both. Parents probably do not stop teaching when their children enter school, so higher achieving children may spend a significant part of their school time waiting for other children to learn skills they already know. Support for individualized study comes primarily from more educated parents. Although in need of further study, schools probably face an important trade-off between equalizing educational opportunity (helping lower achieving children catch up) and helping higher achieving children develop their full potential. There is some evidence from this study that children learn cognitive skills from each other, and in particular that lower achieving children learn from association with higher achieving children.

Finally, lower achieving children and their parents attempted to compensate for their lower skill levels. These children spent more time on homework and less educated parents provided more help to their children, although it was less skilled help. Even though lower achieving children watched more television and this reduced the rate at which applied skills were learned, in total television may be beneficial. Television had a neutral impact on reading skills. This means it may be an effective substitute for other inputs, in particular for lower achieving children who do not have educated parents or access to high achieving peer groups.

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